

### **REMARKS**

Claims 1–3, 5–12, 14–21, 23–28, and 30–37 are pending in the instant Application. Claims 34–37 are withdrawn from prosecution.

Applicants respectfully request that the Examiner notes the new attorney docket number (19662-026001) for the subject application, and asks that the Office records be updated in respect of the same.

### **Amendments to the claims**

Applicants amend claims 1, 2, 5, 9, 10, 11, 14, 17, 23, 31, 32 and 33 to attend to various informalities.

In particular, Applicants amend claim 1 to delete the term ‘different’ as it applies to ‘second pathway’.

Applicants have also amended claim 2 to correct the lack of antecedent basis for the term ‘channel’, replacing it with ‘second pathway’.

Applicants have amended claim 5 to correct the lack of antecedent basis for the term ‘downstream region’, ‘second pathway’.

Claims 9 and 11 are amended herein to depend from claim 1. Claim 9 has also been amended to replace the reference to the ‘downstream region’ with ‘second pathway’. Claim 11 has been amended to delete reference to ‘downstream region’.

Claim 10 is amended to insert a definite article before ‘gas actuator’.

Applicants amend claim 17 to delete the term ‘polymerase chain reaction zone’.

Claim 23 is amended to depend from claim 19, and also to replace the term ‘downstream region’ by ‘lysing zone’, as found in claim 19.

Applicants insert a period at the end of claim 31.

Applicants amend claim 32, to insert an indefinite article before ‘reagent’, and also to attend to various other formalities.

Finally, Applicants also amend claim 33 to depend from claim 32.

Since none of the foregoing amendments introduces new matter, entry thereof into the file history of the instant application is respectfully requested.

## **REJECTIONS OF THE CLAIMS**

### **Rejections under 35 U.S.C. § 112 (¶ 2)**

The Examiner has rejected claims 2, 3, 5 – 12, 17, 32, and 33 under 35 U.S.C. § 112 (second paragraph) as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the various identified claims suffer either from being dependent upon a cancelled claim, or from reciting a term that lacks antecedent basis.

Applicants respectfully submit that, upon entry of the instant amendments to claims 2, 5, 9, 11, 17, 32 and 33, as discussed hereinabove, the various rejections are rendered moot. Accordingly, Applicants respectfully request that the rejections of record be withdrawn.

It is noted that the Examiner has included claims 6 – 8 amongst those rejected under 35 U.S.C. § 112 (second paragraph), but has not articulated a reason why. Applicants see no reason why those claims should have been so rejected and therefore ask the Examiner to withdraw the rejection of these claims or clarify the basis of the rejection in his next communication.

### **Rejections under 35 U.S.C. § 103(a)**

The Examiner has rejected claims 1-3, 5-8, 14-21, 23-28, and 30-33, under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent Application Publication No. 2002/0055167 to Pourahmadi, (“Pourahmadi”, hereinafter), in view of U.S. Patent No. 6,130,098 to Handique (“Handique” hereinafter).

The U.S. Patent and Trademark Office (“PTO”) bears the burden of establishing a *prima facie* case of obviousness. *In re Bell*, 26 USPQ2d 1529 (Fed. Cir. 1993). To establish a *prima facie* case, the PTO must satisfy three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the reference teachings in the manner suggested by the PTO. *In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998). Second, the skilled artisan, in light of the teachings of the prior art, must have a reasonable expectation that the modification or combination suggested by the PTO would be successful. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Finally, the prior art reference, or references when combined, must teach or suggest each and every limitation of the claimed invention. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA

1974). The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, not in the Applicants' disclosure. *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991). If any one of these criteria is not met, *prima facie* obviousness is not established.

Applicants respectfully submit that the Examiner has not satisfied the Office's burden of establishing a *prima facie* case, at least because no motivation to combine the references has been found, and also because Applicants respectfully disagree with the Examiner's assertion that one of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Pourahmadi and Handique.

In essence, the Examiner asserts that Pourahmadi discloses each element of independent claims 1 and 19, except for a gas actuator. Since Handique discloses a gas actuator for facilitating fluid transport in a microfluidic device, the Examiner alleges that one of ordinary skill in the art would have had a reasonable expectation that the respective teachings could be successfully combined.

Applicants respectfully disagree. First, Pourahmadi discloses a device for "processing relatively large fluid samples (*e.g.*, 0.1 to 10 mL)" (Pourahmadi, at [0045]). As the Examiner can appreciate, such sample sizes are equivalent to 100  $\mu\text{L}$  – 10,000  $\mu\text{L}$ . (See also, Pourahmadi at [0163] "the volume of fluid sample forced to flow through the device is in the range of 1 to 100 mL"). In Pourahmadi, the preferred source of fluid motive source is an electrolytic pump (see, *e.g.*, Pourahmadi at [0065]). Although Pourahmadi does reference "[o]ther potential fluid motive sources include[ing] a pneumatic pressure source" (at [0067]), it is silent as to the implementation or efficacy of such sources. Indeed this description can at best be regarded as prospective, rather than a description of an actual embodiment.

By contrast, Handique teaches a method of moving microdroplets having a volume in the range "between approximately 0.01 and 100 nanoliters" (Handique at col. 7, lines 60-62). (1 nanoliter =  $10^{-3}$   $\mu\text{L}$ , so the volumes contemplated by Handique are in the range  $10^{-5}$  –  $10^{-1}$   $\mu\text{L}$ .) The largest such volumes are therefore around 1,000 times smaller than the *smallest* liquid volumes deployed by Pourahmadi.

Neither Handique nor Pourahmadi provide a teaching that a gas actuator disclosed by Handique would be effective to move the large sample volumes deployed by Pourahmadi. In fact, it can be shown that the volume of gas in an actuator exceeds the volume of liquid that it is required to move by at least a factor of 5. See, *e.g.*, Handique, *et al.*, "On-Chip

Thermopneumatic Pressure for Discrete Drop Pumping”, *Anal. Chem.*, 73:1831-1838, (2001), (a copy of which is attached hereto as an Appendix), specifically at page 1835, right hand column.

Thus, it can be seen that, in order to move the volumes of liquid processed by Pourahmadi by using a gas actuator, an impractically large pump volume compared to the overall device size would be required. This is because not only are the volumes of fluid deployed by Pourahmadi many orders of magnitude larger than those of Handique, but the gas volume required must itself still be many times greater in size again. In short, the Examiner has not established that the gas actuator of Handique could practically be deployed in Pourahmadi’s device due to the large volumes of gas that would need to be stored.

For at least this reason, one of ordinary skill in the art would not have had a reasonable expectation of success that the actuator of Handique could be employed in the apparatus of Pourahmadi.

Finally, the Examiner has not articulated a motivation for one of ordinary skill in the art to combine the teachings of Pourahmadi and Handique. Applicants additionally submit that one of ordinary skill in the art would have concluded, upon appreciating the teachings of both Pourahmadi and Handique, that a combination of the two would have been impractical and therefore undesirable, based upon the gas volumes that would be needed and thus would not have been motivated to combine them.

Dependent claims are nonobvious under 35 U.S.C. § 103 “if the independent claims from which they depend are nonobvious.” *In re Fine* 837 F.2d 1071; 5 USPQ.2d 1596; MPEP 2143.03.

Applicants note that the subject matter of claims 9 – 12 has not been addressed by the Examiner in light of Pourahmadi and Handique. Since claims 9 – 12 were rejected under 35 U.S.C. § 112 (second paragraph) for depending from a cancelled claim, a rejection which has been obviated by amendments herein, Applicants also respectfully submit that the foregoing arguments, rebutting the allegation of obviousness of all other pending claims, have equal force as regards claims 9 – 12, were the Examiner to allege that such claims are obvious on similar grounds.

Accordingly, Applicants respectfully submit that all of the pending claims, whether rejected under 35 U.S.C. § 103 or not, are non-obvious in view of Pourahmadi and Handique, and ask that the rejection of record be removed.

**CONCLUSION**

In view of the above remarks, Applicants respectfully submit that the subject application is in good and proper order to proceed to issue. If, in the opinion of the Examiner, a telephone conference would resolve any outstanding matters not heretofore resolved, the Examiner is encouraged to call the undersigned at (650) 839-5070.

No fee is believed owed in connection with filing of this amendment. Nevertheless, should the Commissioner determine otherwise, he is authorized to charge any underpayment or credit any overpayment to Applicants' Deposit Account No. 06-1050 (reference 19662-026001).

Respectfully submitted,

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